



What Is Claimed Is:

- 1. An isolated nucleic acid molecule encoding a pancreatic T-type calcium channel.
- 1 2. The isolated nucleic acid molecule of claim 1 wherein said nucleic acid is deoxyribonucleic acid.
- 1 3. The solated nucleic acid molecule of claim 2 wherein said deexyribonucleic acid is cDNA.
- 1 4. The iso ated nucleic acid molecule of claim 3
 2 wherein said nucleic acid molecule has a nucleotide
 3 sequence as shown in SEQ ID NO:1.
- 5. The isolated nucleic acid molecule of claim 1 wherein said nucleic acid molecule encodes an amino acid sequence as shown in SEQ ID NO:2.
- 1 6. The isolated nucleic acid molecule of claim 1 wherein said nucleic acid is ribonucleic acid.
- 7. The isolated nucleid acid molecule of claim 6 wherein said ribonucleic acid is mRNA.
- 8. An antisense nucleic acid molecule complementary to at least a portion of the mRNA of claim 7.
- 9. A cell comprising the antisense nucleic acid molecule of claim 8.
- 1 10. An expression vector comprising the antisense 2 nucleic acid molecule of claim 8.

- 1 11. The expression vector of claim 10 wherein the expression vector is selected from the group consisting of a plasmid and a virus.
- 1 12. A cell comprising the expression vector of claim 10.
- 1 13. A method of decreasing expression of a
 2 pancreatic T-type calcium channel in a host cell, said
 3 method comprising introducing the antisense nucleic acid
 4 molecule of claim 8 into the cell, wherein said antisense
 5 nucleic acid molecule blocks translation of said mRNA so
 6 as to decrease expression of said pancreatic T-type
 7 calcium channel in said host cell.
- 1 14. A ribozyme having a recognition sequence 2 complementary to a portion of the mRNA of claim 7.
- 1 15. A cell comprising the ribozyme of claim 14.
- 1 16. An expression vector comprising the ribozyme of claim 14.
- 1 17. The expression vector of claim 16 wherein the expression vector is selected from the group consisting of a plasmid and a virus.
- 1 18. A cell comprising the expression vector of claim 16.
- 1 19. A method of decreasing expression of a 2 pancreatic T-type calcium channel in a host cell, said 3 method comprising introducing the ribozyme of claim 14 4 into the cell, wherein expression of said ribozyme in

- 5 said cell results in decreased expression of said 6 pancreatic T-type calcium channel in said cell.
- 1 20. A cell comprising the nucleic acid molecule of claim 1.
- 1 21. An expression vector comprising the nucleic 2 acid molecule of claim 1.
- 1 22. The expression vector of claim 21 wherein said 2 expression vector is selected from the group consisting 3 of a plasmid and a virus.
- 23. A cell comprising the expression vector of claim 21.
- 1 24. A method of increasing expression of pancreatic 2 T-type calcium channel in a host cell, said method 3 comprising:
- introducing the nucleic acid molecule of claim 1 into the cell; and
- allowing said dell to express said nucleic acid molecule resulting in the production of pancreatic T-type calcium channel in said cell.
- 25. A method of screening a substance for the ability of the substance to modify T-type calcium channel function, said method comprising:
- introducing the nucleic acid molecule of claim 1 into a host cell;
- expressing said pancreatid T-type calcium channel encoded by said nucleic acid molecule in the host cell;
- 8 exposing the cell to a substance; and

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9
          evaluating the exposed cell to determine if the
10
     substance modifies the function of the T-type calcium
11
     channe1.
          26.
               The method of claim 25 wherein said evaluation
 1
 2
               monitoring the expression of T-type calcium
     comprises \
 3
     channel.
               A method of obtaining DNA encoding a pancreatic
 1
     T-type calcium channel, said method comprising:
 2
 3
          selecting \a DNA molecule encoding a pancreatic T-
     type calcium channel, said DNA molecule having a
 4
 5
     nucleotide sequence as shown in SEQ ID NO:1;
          designing an oligonucleotide probe for a pancreatic
6
7
     T-type calcium channel based on SEQ ID NO:1;
8
          probing a genomic or cDNA library of an organism
9
     with the oligorucleotide probe; and
10
          obtaining clones from said library that are
     recognized by said dligonucleotide probe, so as to obtain
11
     DNA encoding a pancreatic T-type calcium channel.
12
               A method of braining DNA encoding a pancreatic
1
          28.
    T-type calcium channel, said method comprising:
2
               selecting a DNA molecule encoding a pancreatic
3
    T-type calcium channel, said DNA molecule having a
4
    nucleotide sequence as shown in SEQ ID NO:1;
5
6
               designing degenerate oligonucleotide primers
7
    based on SEQ ID NO:1; and
              utilizing said oligonucleotide primers in a
8
    polymerase chain reaction on a DNA sample to identify
9
    homologous DNA encoding a pancreatic T-type calcium
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channel in said sample.

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- 29. An isolated nucleic acid molecule encoding a pancreatic T-type calcium channel, said nucleic acid molecule encoding a first amino acid sequence having at least 90% amino acid identity to a second amino acid sequence, said second amino acid sequence as shown in SEQ ID NO:2.
- 1 30. A DNA oligomer capable of hybridizing to the nucleic acid molecule of claim 1.
- 1 31. A method of detecting presence of a pancreatic 2 T-type calcium channel in a sample, said method 3 comprising:

contacting a sample with the DNA oligomer of claim

30, wherein said DNA oligomer hybridizes to any of said

pancreatic T-type calcium channel present in said sample,

forming a complex therewith; and

detecting said domplex, thereby detecting presence of a pancreatic T type caldium channel in said sample.

- 1 32. The method of claim 31 wherein said DNA oligomer is labeled with a detectable marker.
- 1 33. An isolated pandreatic T-type calcium channel protein.
- 34. The pancreatic T-type calcium channel protein of claim 33 wherein said pancreatic T-type calcium channel protein is encoded by a nucleotide sequence as shown in SEQ ID NO:1.
- 1 35. The pancreatic T-type dalcium channel protein 2 of claim 33 wherein said pancreatic T-type calcium

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- 3 channel protein is encoded by an amino acid sequence as shown in SEQ ID NO:2. 4
- An isolated pancreatic T-type calcium channel 1 2 protein encoded by a first amino acid sequence having at least 90% amino acid identity to a second amino acid 3 sequence, said\second amino acid sequence as shown in SEQ 4 ID NO:2. 5
- An antibody or fragment thereof specific for 1 2 the pancreatic T-type calcium channel protein of claim 3 36.
- The antibody of claim 37 wherein said antibody 1 38. 2 comprises a monoclonal \antibody.
- The antibody of claim 37 wherein said antibody 1 comprises a polyclonal antibody.
- A composition comprising the pancreatic T-type 1 calcium channel protein of claim 36 and a compatible 2 3 carrier.
- A method of detecting presence of a pancreatic 1 T-type calcium channel protei \mathfrak{h} in a sample, said method 2 comprising: 3
 - contacting a sample with the antibody or fragment thereof of claim 37, wherein said antibody or fragment thereof binds to any of said pancreatic T-type calcium channel protein present in said\sample, forming a complex therewith; and
- detecting said complex, thereby detecting presence 9 of a pancreatic T-type calcium channel protein in said 10 sample. 11

- 1 42. The method of claim 41 wherein said antibody or
- 2 fragment thereof is beled with a detectable marker.
- 1 43. A method of modifying insulin secretion by
- 2 pancreatic beta cells, the method comprising modifying
- 3 levels of functional T type calcium channels in the
- 4 pancreatic beta cells.
- 1 44. The method of claim 43 wherein modifying levels
- 2 of functional T type calcium channels comprises modifying
- 3 T type calcium channel gene expression in the pancreatic
- 4 beta cells.
- 1 45. The method of claim 44 wherein modifying T type
- 2 calcium channel gene expression comprises exposing the
- 3 pancreatic beta cells to a compound which modifies T type
- 4 calcium channel gene expression.
- 1 46. The method of claim 45 wherein the compound is
- 2 an antisense oligonucleotide targeted to the T type
- 3 calcium channel gene.
- 1 47. The method of claim 43 wherein modifying levels
- 2 of functional T type calcium channel comprises exposing
- 3 the pancreatic beta cells to an inhibitor of the
- 4 functional T type calcium channel.
- 1 48. The method of claim 43 wherein modifying levels
- 2 of functional T type calcium channel comprises exposing
- 3 the pancreatic beta cells to a compound which interferes
- 4 with membrane T type calcium channel formation.

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- 1 49. The method of claim 43 wherein the pancreatic
- 2 beta cells are present in a subject having type II
- 3 diabetes.
- 50. A method of treating type II diabetes in a subject, the method comprising administering to the subject an amount of a compound effective to modify levels of functional T type calcium channel in the
- 5 pancreatic beta cells of the subject.
- 51. The method of claim 50 wherein the compound modifies levels of functional T type calcium channel by modifying T type calcium channel gene expression.
- 52. The method of claim 51 wherein modifying T type calcium channel gene expression comprises exposing the pancreatic beta cells to a compound which modifies T type calcium channel gene expression.
 - 53. The method of claim 52 wherein the compound is an antisense oligonucleotide targeted to the T type calcium channel gene.
- 1 54. The method of claim 50 wherein the compound is 2 an inhibitor of the functional T type calcium channel.
- 55. The method of claim 50 wherein the compound interferes with membrane T type calcium channel formation.
- 56. A method of modifying basal calcium levels in cells, the method comprising modifying levels of functional T type calcium channels in the cells.

- 57. A method of modifying the action potential of L
 type calcium channels in cells, the method comprising
 modifying levels of functional T type calcium channels in
 the cells.
- 1 58. A method of modifying pancreatic beta cell 2 death, the method comprising modifying levels of 3 functional T type calcium channels in the pancreatic beta 4 cells.
- 59. A method of modifying pancreatic beta cell proliferation, the method comprising modifying levels of functional T type calcium channels in the pancreatic beta cells.
- 1 60. A method of modifying calcium influx through L
 2 type calcium channels in cells, the method comprising
 3 modifying levels of functional T type calcium channels in
 4 the cells.